

Unclassified

Air Combat Environment Test & Evaluation Facility



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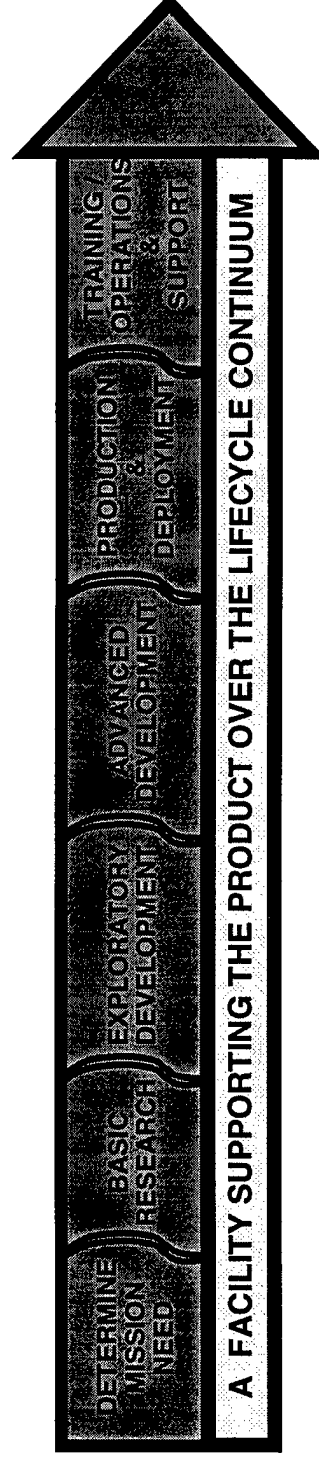
PUBLIC AFFAIRS OFFICE
NAVAL AIR SYSTEMS COMMAND

H. Howard



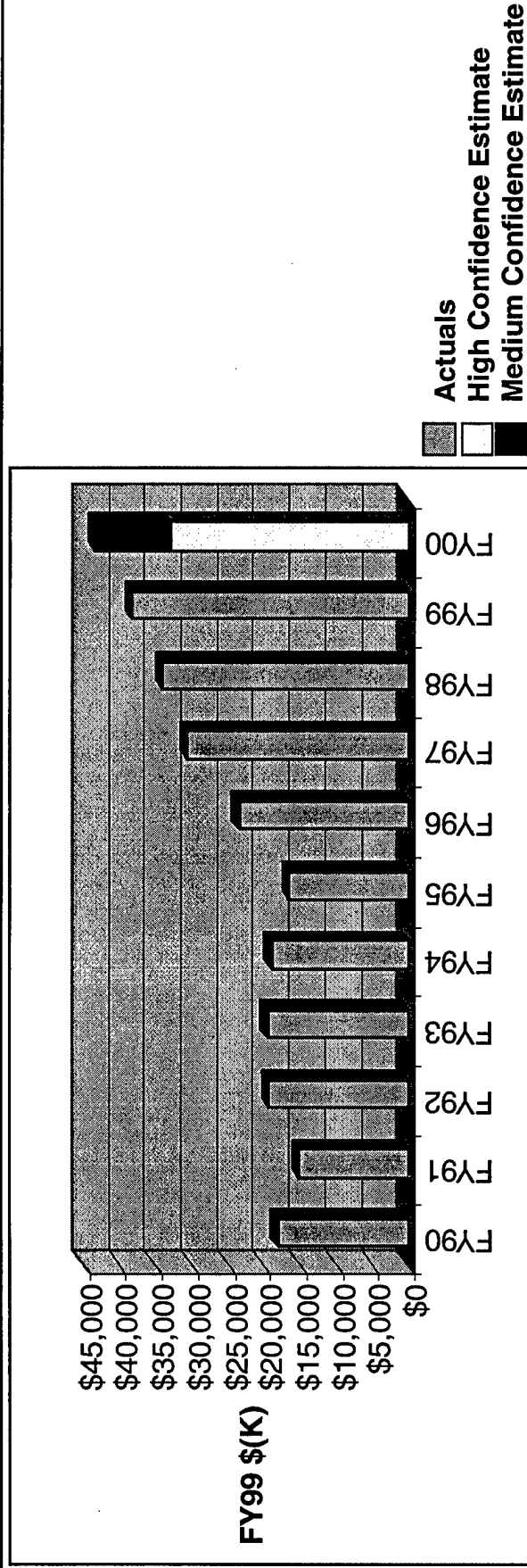
ACETEF Mission

ACETEF's primary mission is to reduce technical risk and cost for Navy aircraft and aircraft systems through the use of simulation and stimulation during installed systems testing. The facility provides a multitude of resources and capabilities which are used for Research, Development, Test and Evaluation (RDT&E) and Training in support of the systems development process and systems deployment.



Providing a capability which makes comprehensive Acquisition, RDT&E and Training more affordable

ACETEF Projected Workload

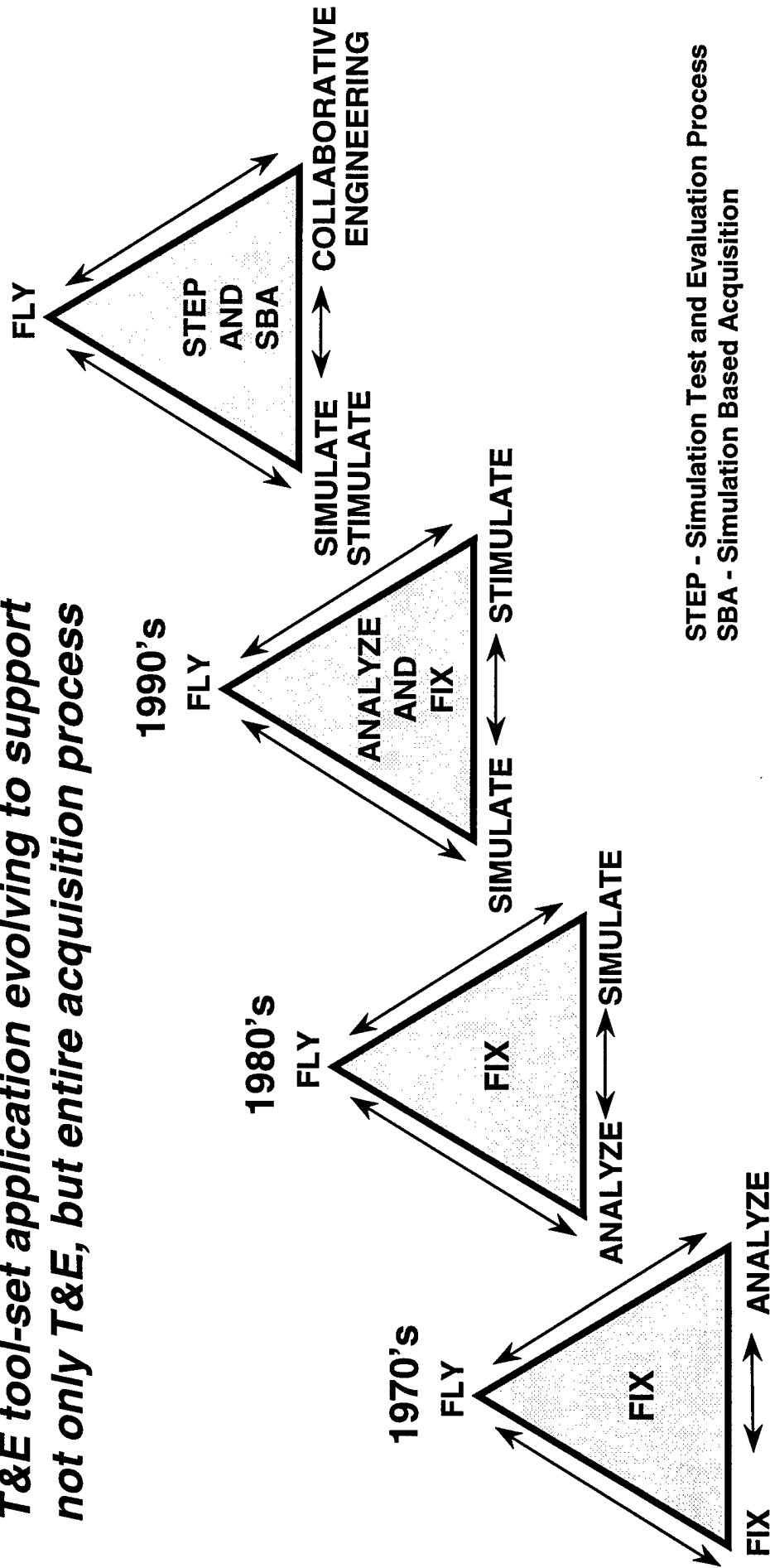


- ACETEF Workload Increased during declining DoD budget Years
- Increased use of Modeling and Simulation
- Increasing complexity of Aviation Systems drive testing to ACETEF like environments
- Integration of Network Centric Warfare capabilities into Naval Aviation will require complex and secure ground test environments that ACETEF can provide
- ACETEF recognized innovator in Simulation Based Acquisition

T&E “Tool-Set” Evolution

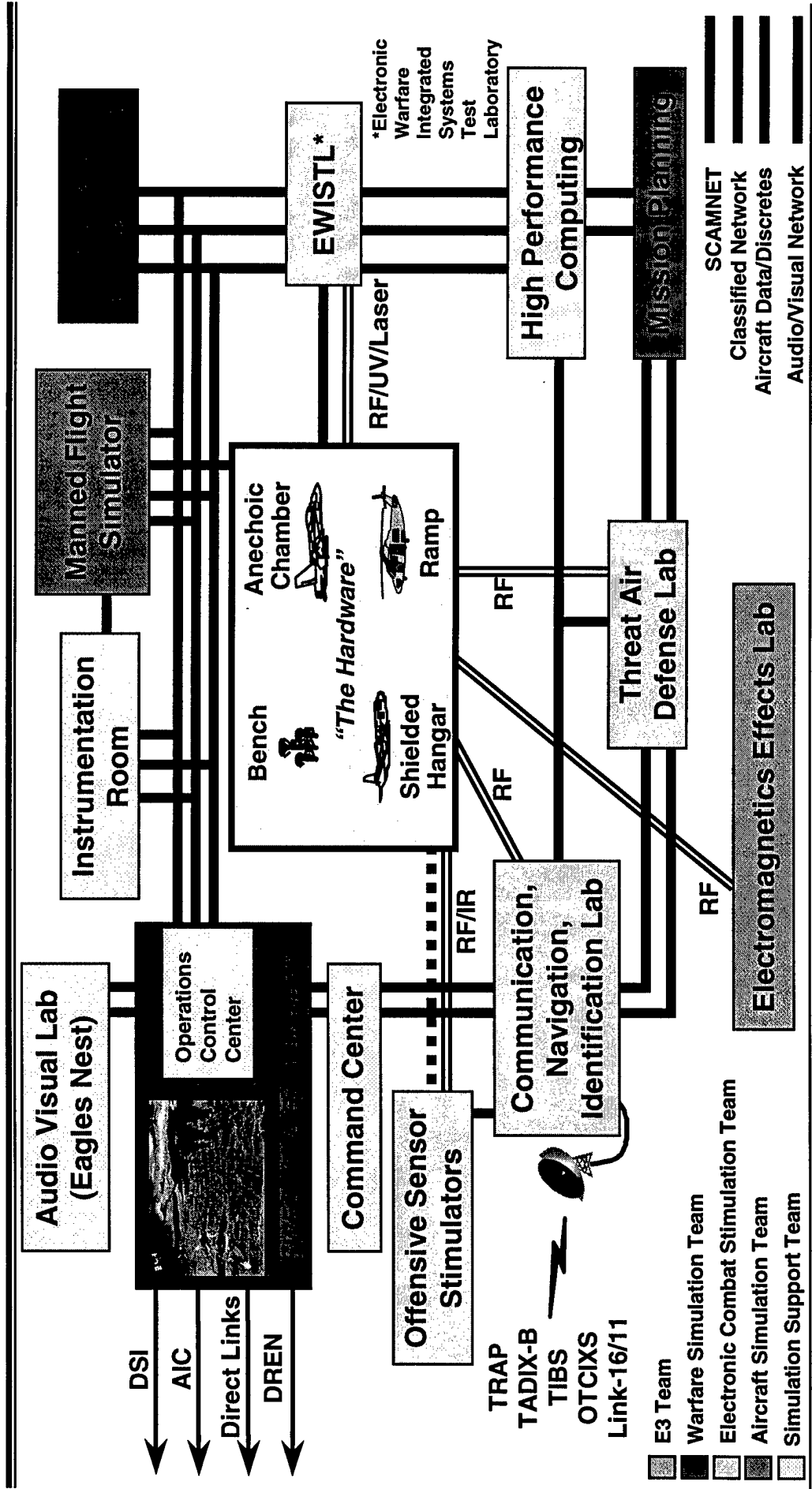
T&E tool-set application evolving to support not only T&E, but entire acquisition process

“THE FUTURE”



STEP - Simulation Test and Evaluation Process
SBA - Simulation Based Acquisition

ACETEF ARCHITECTURE



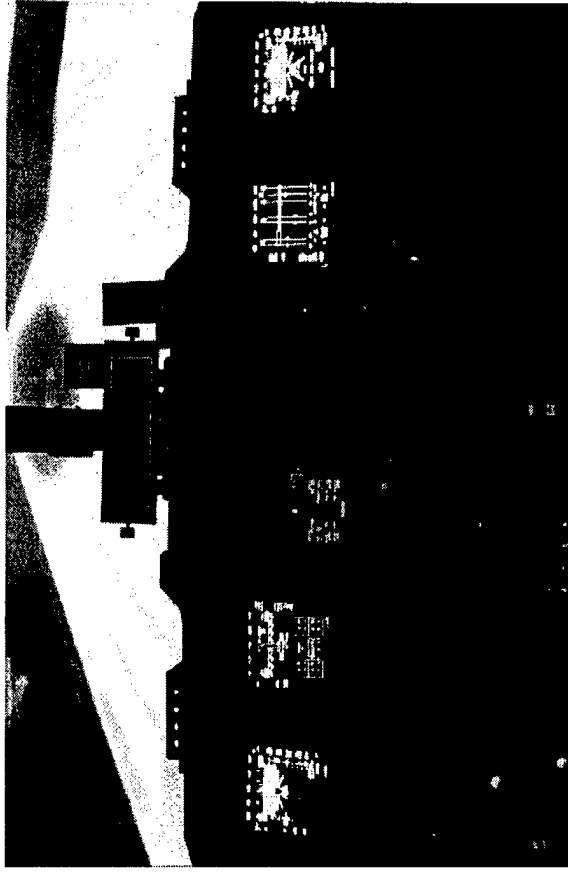
Manned Flight Simulator

- Three High Fidelity Test Stations
 - 40 Ft Diameter Dome Projection System
 - Wide II Image Projection Sys (200° X 40°)
 - 6 DOF Rediffusion Motion Platform
 - M2DART Test Station (Improved Resolution)
- Two Low Fidelity Test Stations (200° X 40°)
- General Electric Compu-Scene Imaging Sys
- Linked to Live Test Range



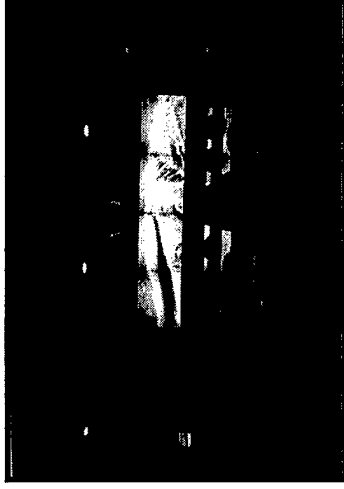
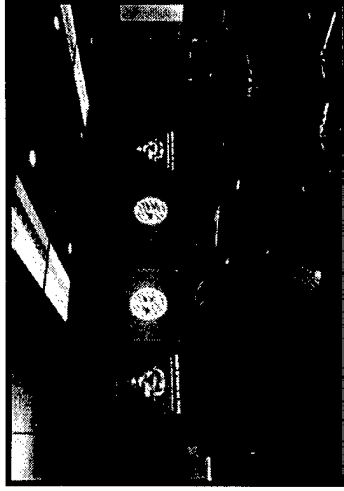
F/A-18 in Dome

V-22 in Motion Bay



- High Fidelity Cockpits
 - F/A-18 C/D
 - V-22 EMD
 - F-14 D
 - Hardware-in-the Loop
 - Flight Control Computer Systems
 - Mission Computers
 - Multi-Function Displays
- F/A-18 E/F
V-22 Prod
AH-1W

Operations & Control

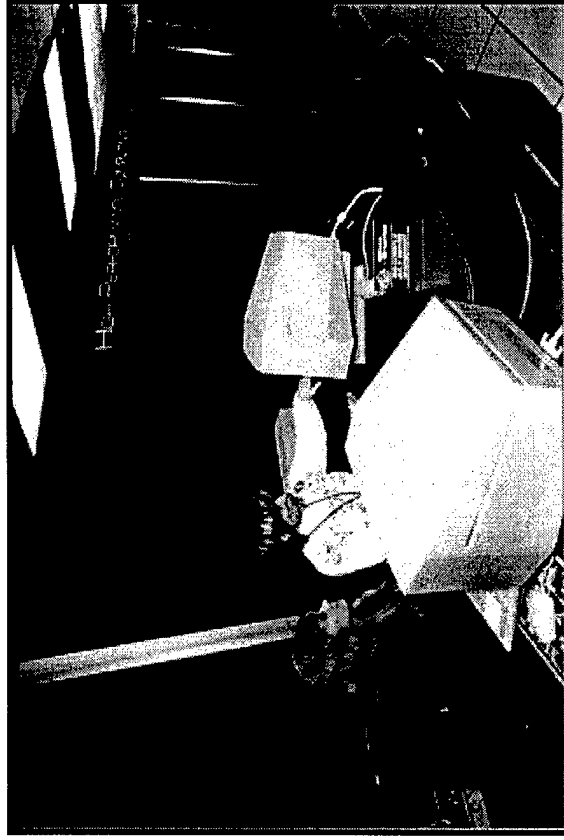


- Test Command and Control
- Test Visualization
- Facility Instrumentation
 - Loral 550 Front Ends and Alpha Workstations
- Internal/External Links
 - External: DSI, DREN, AIC, Direct Links
 - Internal: Shared Memory, Switched Ethernet/FDDI, Audio, Video
- Facility Video
- Facility Intercom
- Master GPS Time Source



Operations and Control Center

High Performance Computing



HPC Computational Technology Areas

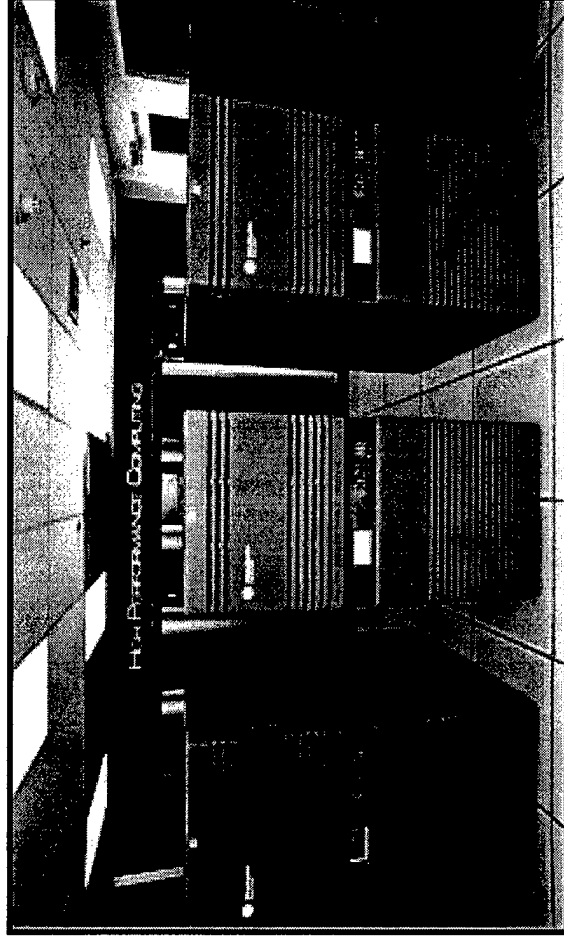
Integrated Modeling & Test (IMT)

Signal/Image Processing

Computational Fluid Dynamics

Computational Electromagnetics

Force Modeling



ACETEF Success Stories

Joint Theater Missile Defense

Inverse Synthetic Aperture Radar Imaging

F/A-18 E/F Flying Qualities

E-2C Phased Array Modeling

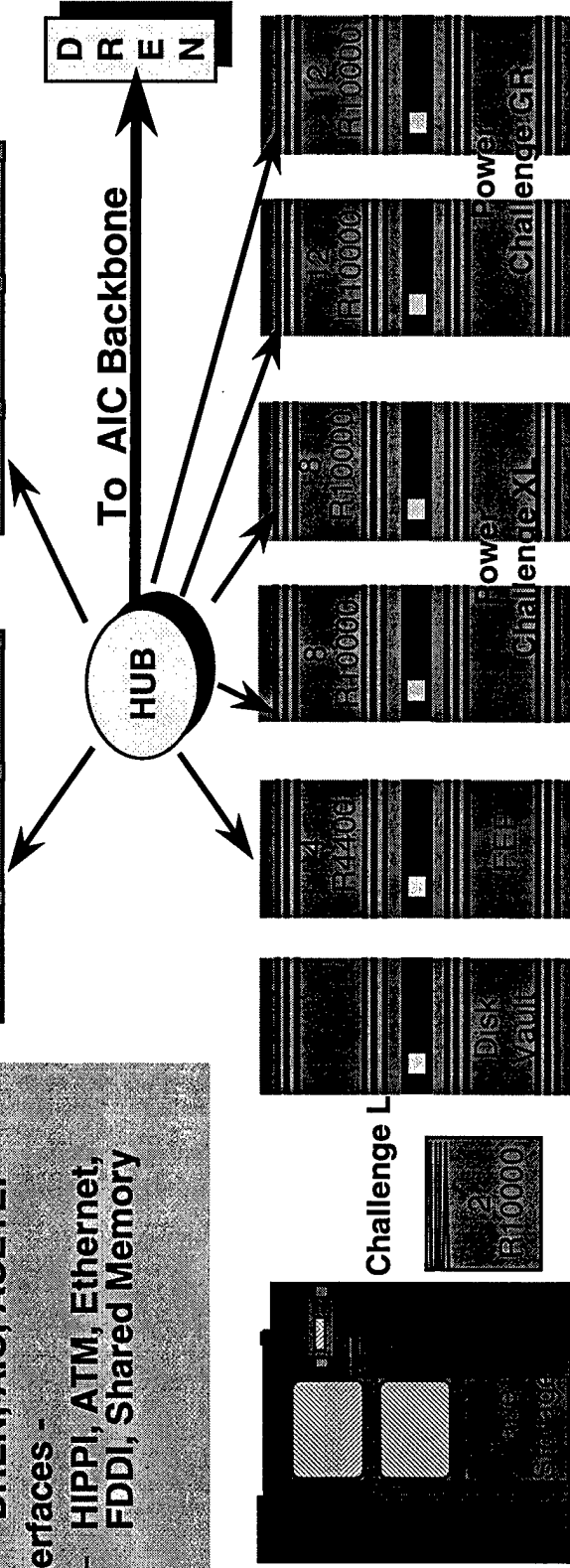
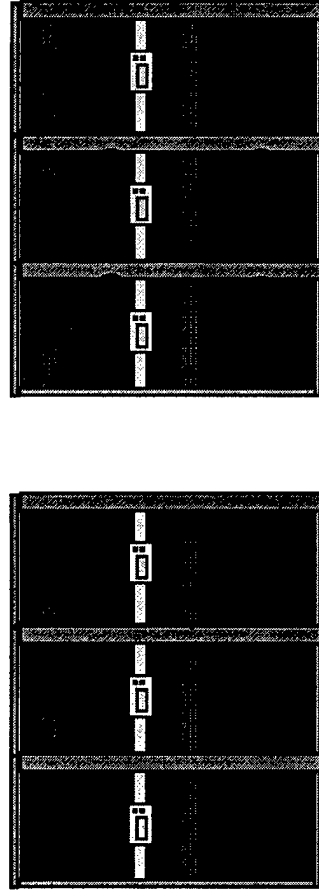
“Origin 2000” Power Scene

JSF Force Process Team Simulations

High Performance Computing

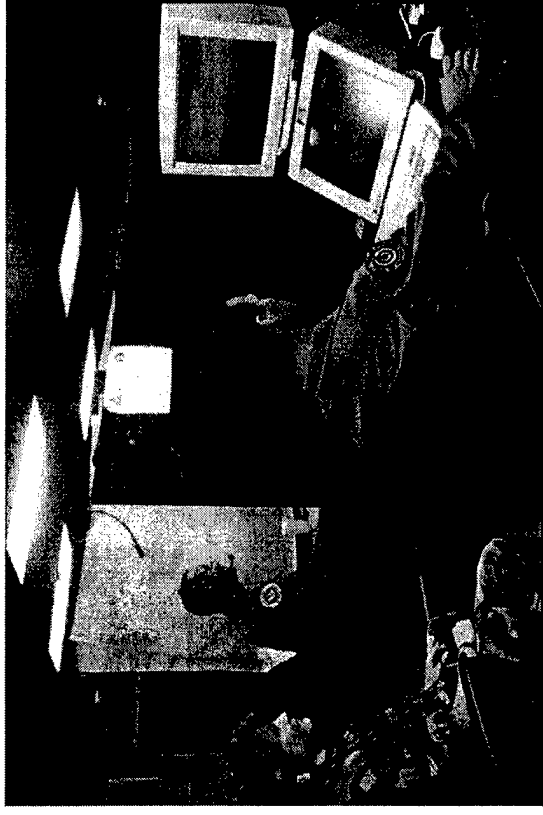
- ~42 GFLOPS
- 106 Total Processors
- 36 GB Main Memory
- 1 TB Main Disk Storage
- 12 TB Mass Archive Storage
- 9 Infinite Reality Engines
- Connectivity -
 - DREN, AIC, ACETEF
- Interfaces -
 - HIPPI, ATM, Ethernet, FDDI, Shared Memory

Onyx 2



Warfare Simulation Lab

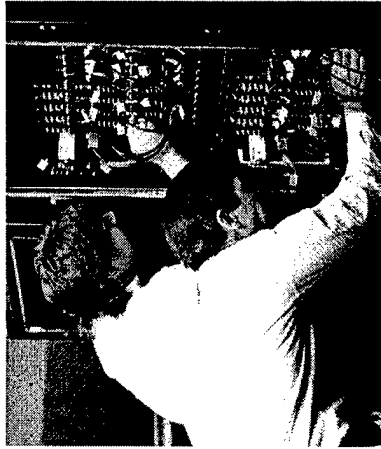
Mini-Crewstations



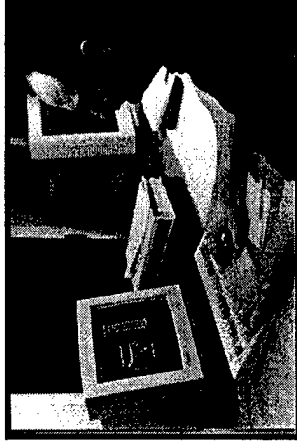
- **Manned Virtual Stations**
 - SGI OTW Image Generation
 - Four Heads Up/Down Stations
 - Ten Heads Up Stations
 - Generic Platform & System Models
 - Attack / Sensors / C2 / Weapons/
Aero / Controls

- **Mission Planning and Rehearsal**
 - JMCIS / TAMPS
 - AFMSS / CIS
 - CLOAR
 - TOPSCENE / Powerscene

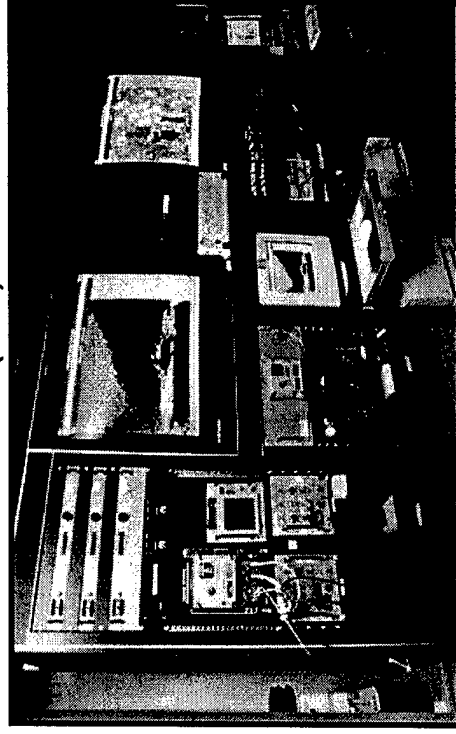
Comm, Nav, Ident Lab



Communications
Environment Simulator (CES)



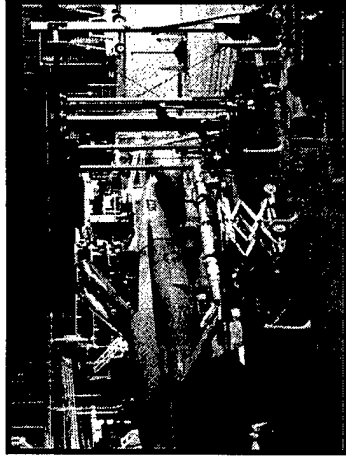
GPS & Aux Nav Simulator



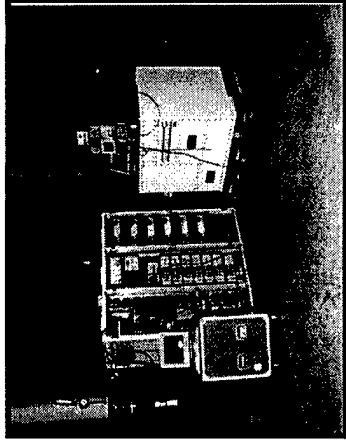
Strategic Data Link Simulator (SDLS)

- **Communications Environment Simulator**
 - Phase and Amplitude Distribution Ports
 - Number of Simultaneous Emitters: 64
 - High Fidelity, 128 Background
 - RF Coverage: 500 kHz to 18 Ghz
- **Strategic Data Link Simulator (SDLS)**
 - OTCIXS/TRAP/TIBS/TADIXS-B
- **Data Link Simulator - MLST3**
 - Link 4A/Link 11/Link 16 (Link 16 Gateway)
 - LDDS-11 - DTSS-11 (2)
 - Provides Land-line Link-11 (5 site)
- **GPS & Aux Nav Simulator**
 - 20 Satellite Constellation at RF
 - C/A, P & Y Codes (L1 and L2 Frequencies)
 - Selective Availability/Anti-Spoofing
- **Airborne IFF Test System (AITS)**

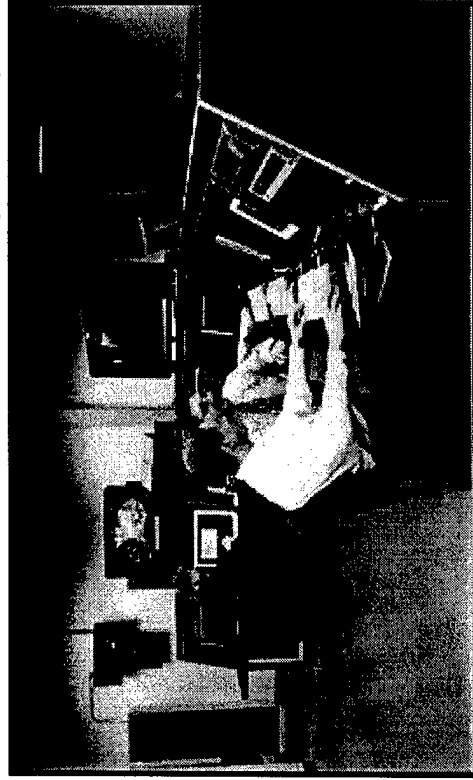
Electronic Warfare Integrated Systems Test Laboratory



Remote Antenna Positioning System (RAPS)



Advanced Tactical Electronic Warfare Environment Simulator (ATEWES)



Electronic Warfare Integrated Systems Test Laboratory

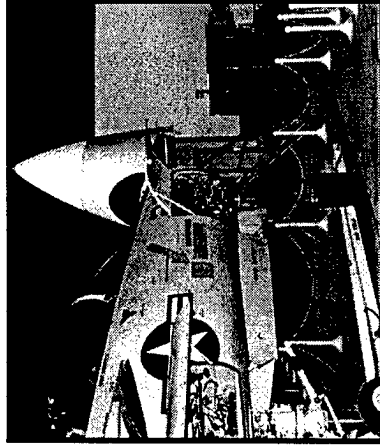
- **ATEWES**

- Phase and Amplitude Distribution Ports
 - 2 Quad - 8 Element Phase AOA
 - 8 Element Amplitude AOA
- Number of Simultaneous Emitters: 1024
- Max Number of Platforms: 255
- Pulse Density: 1Mpps @2% Drop, 4Mpps Max
- RF Coverage: 0.05-18.0 GHz, 32.0-40.0 GHz
- Emitter Library Modes: 7000

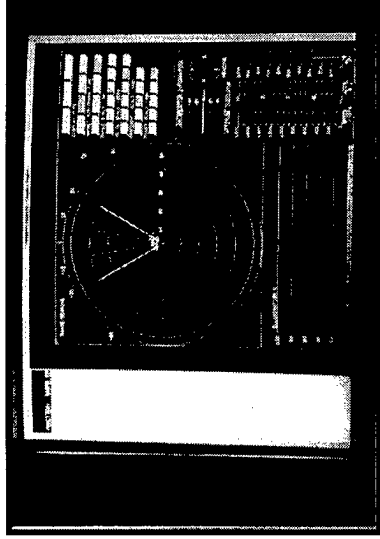
- **Remote Antenna Positioning System (RAPS)**

- Two Moving Targets in Two Dimensions
- Mounts Controllable in Azimuth, Elevation and Pointing Angle
- Supports RF, EO, and IR Sources
- Provides 10' x 10' FOV
- Max Slew Rate: 50 Inches/Sec

Offensive Sensors

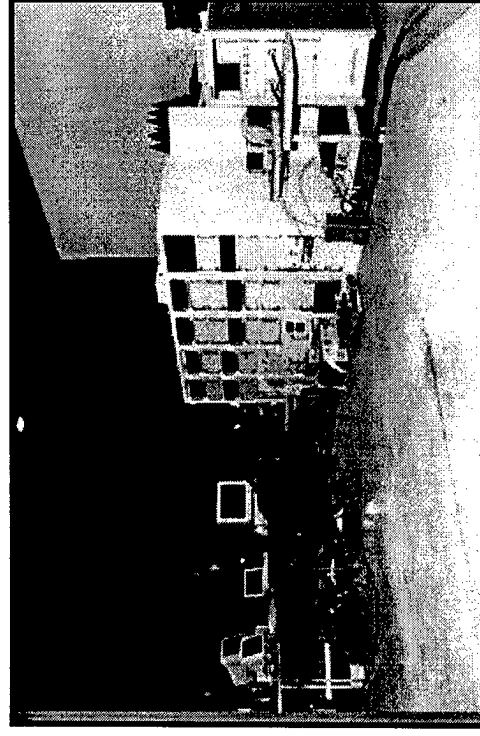


F-14 Tomcat RTS Testing



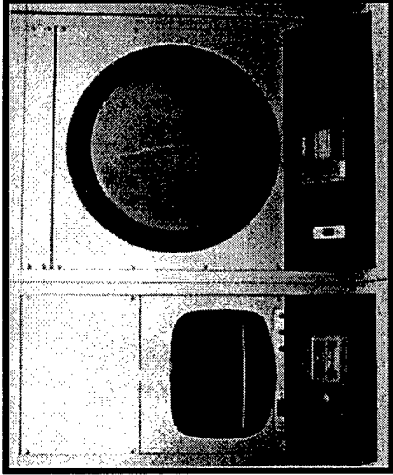
RTS Display

- Radar Target Simulator (RTS)
 - A/A
 - F/A-18 Interface
 - F-14 D Interface
 - 32 Targets (max 4 in the beam)
 - +ECM, Scenario Driven
- Dynamic Infra-Red Point Source Simulator
 - Two IR point source targets
 - 8 - 12 mm region
 - Independent Position, motion, and intensity target control



Radar Target Simulator (RTS)

Threat Air Defense Lab

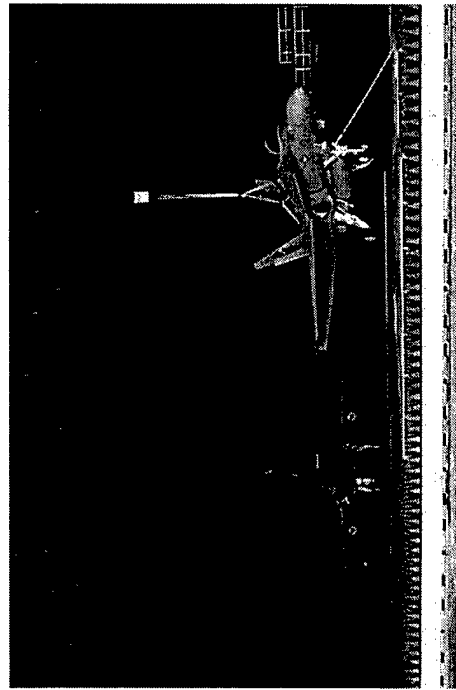
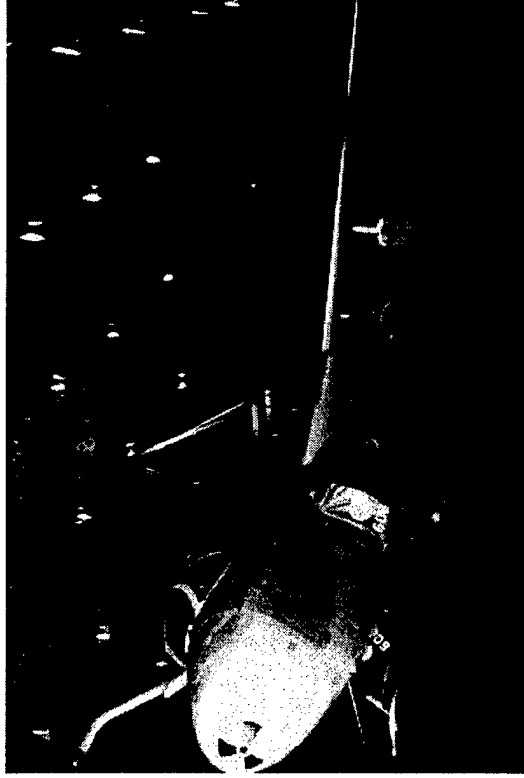
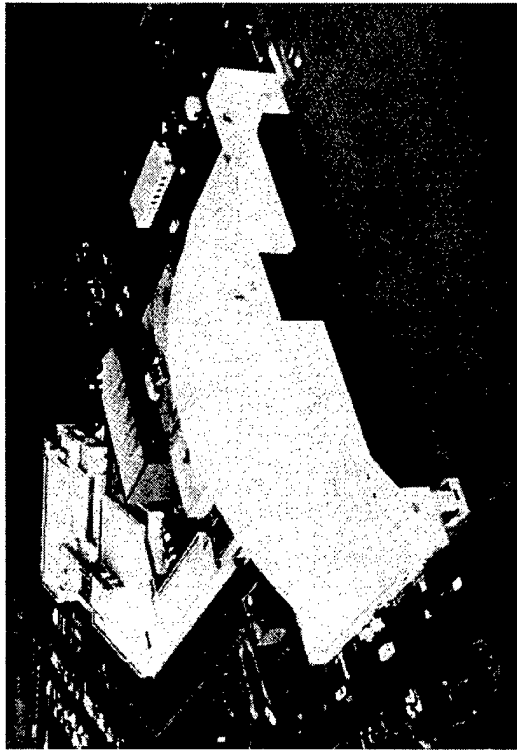


TADL Displays



- **SAM Simulation System (I-23)**
 - Frequency Range: X-Band
 - Closed Loop Threat Systems
 - Man-in-the-Loop
 - Seeker-in-the-Loop
 - Open Air Range Correlated Equipment
 - Validated Radar and Missile Flyout Model
- **EW Acquisition System (EW ACQ)**
 - Frequency Range: 800Mhz - 3Ghz
 - Closed Loop Early Warning Radars
 - Man-in-the-Loop
 - Simulates up to 3 RED Systems
 - Provides Handoff to I-23
 - Low Band Threats IOC FY98

Shielded Hangar/ Anechoic Chamber



- Anechoic Chambers provide RF pure environments for Electromagnetic Environmental Effects Testing of components and complete systems
- Secure environments
- Have supported air platforms, weapon systems, ground vehicles and satellites
- Large Chamber Projects since ribbon cutting - S-3B, F/A-18, AH-1W, E-2C, FME, F/A-18E/F

Future Upgrades

System	Size	Cost
Generic Radar Target Generator	7 racks	\$20.8M
Joint Communications Simulator	20 racks	\$33.6M
Infrared Scene Simulator	3 racks	\$24.0M

ACETEF Support to OT&E

- Rigorous Accreditation Effort**
- COTF
 - Lessons Learned with ALR-67
 - TEAM effort w/OTD & ITT

Initial Trial during OT-IID

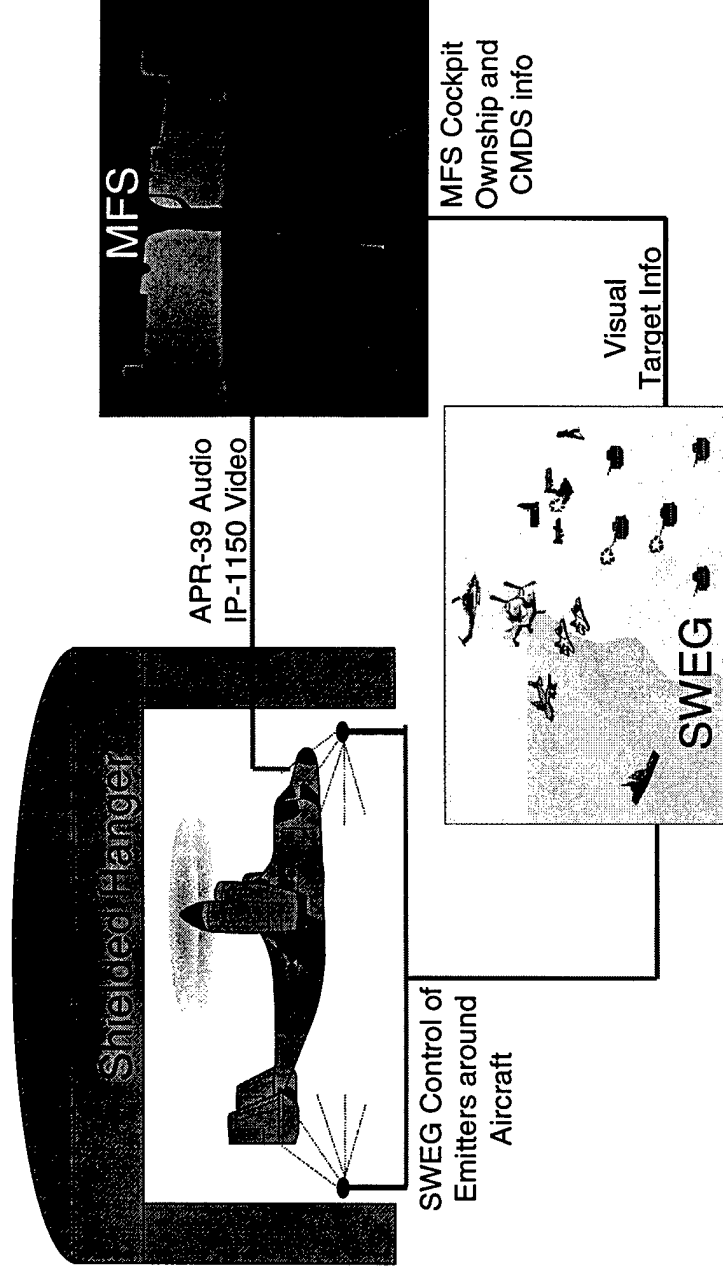
- Currently executing OT-IIE**
- Completed first phase
 - others scheduled CY-00

- Highly realistic TRAP Mission**
- Extensive re-use of JSF work
 - Scenarios, data bases
 - Tri-service validation efforts

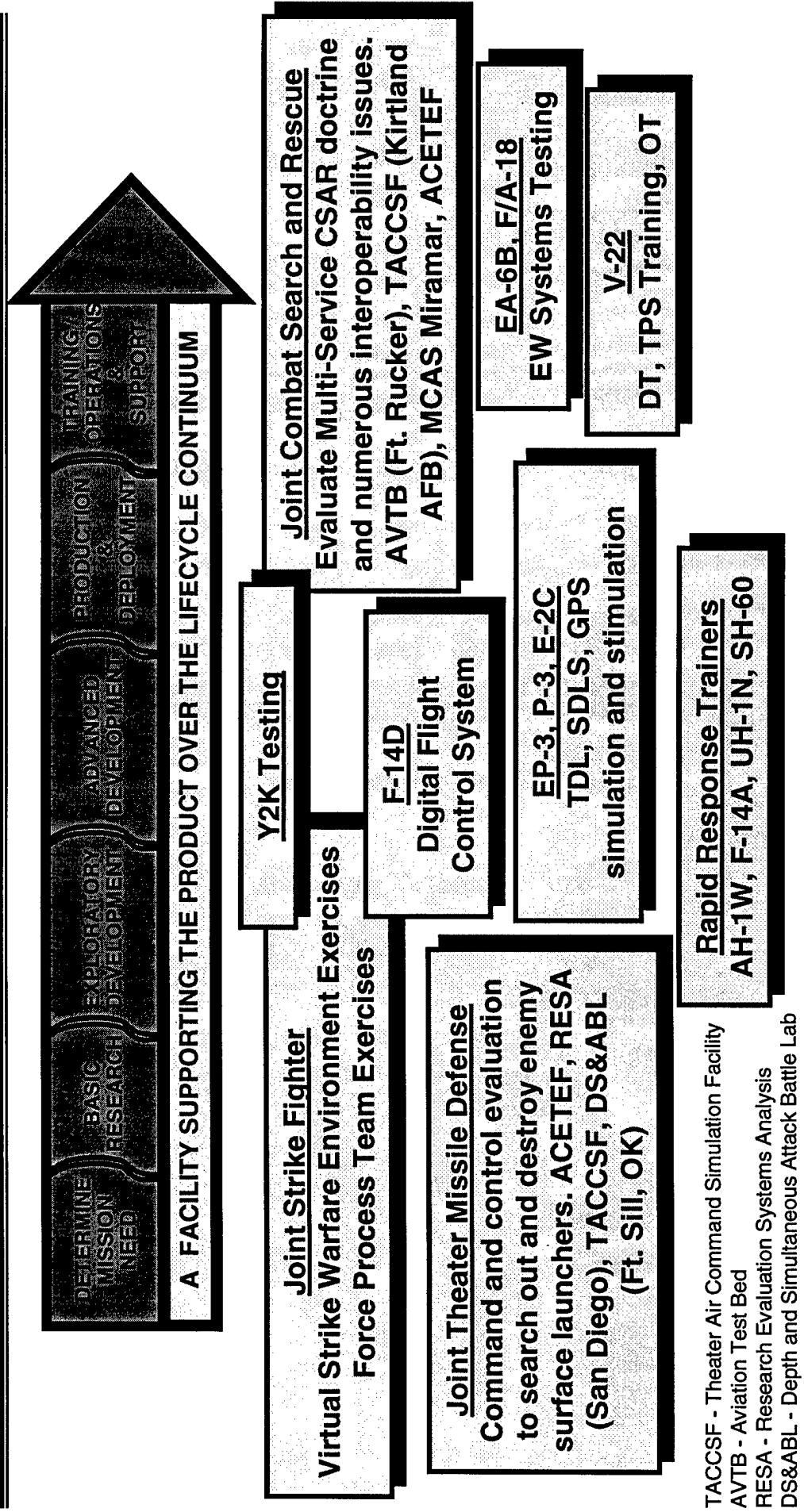
Multi-Sensor Stimulation

- APR-39
- AAR-47
- AVR-2
- FLIR (Simulated)

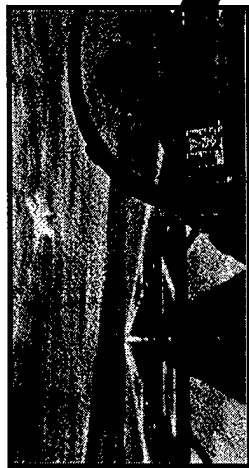
Provides scenarios and threat density un-available in the US.



T&E “building blocks” applied beyond “traditional” T&E



Any Questions



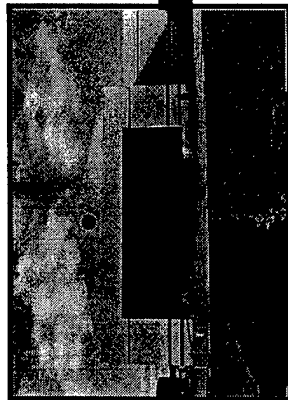
Manned Flight Simulator



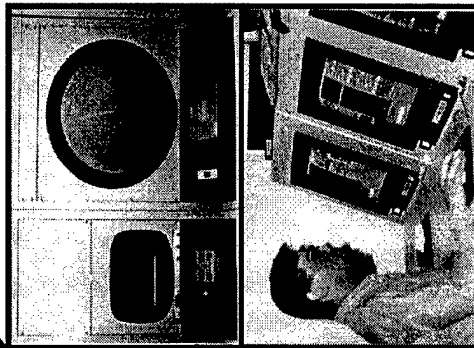
Electronic Warfare Integ Sys Test Lab



Shielded Hangar



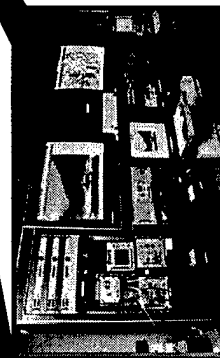
Large Anechoic Chamber



Threat Air Defense Lab



Operations & Control Center



Comm, Nav, IFF Lab



High Performance Computing